

Patent Claims

1. A DNA chip comprising a carrier (14) and, arranged thereon, a microarray of spots (1) containing immobilized catcher molecules, each spot (1) containing a microelectrode system for the impedance-spectroscopic detection of binding events between the catcher molecules and target molecules of an analyte solution (38) applied to the spots (1), characterized in that the microelectrode system is a thin-film four-pole system, the thin-film four-pole system comprising two polarization electrodes (2, 4) for generating an alternating electromagnetic field and two sensor electrodes (8, 10) for measuring a voltage drop in the analyte (38).
2. The DNA chip as claimed in claim 1, characterized in that the carrier (14) comprises a silicon substrate (34), on which the microelectrode system is integrated using thin-film technology.
3. The DNA chip as claimed in claim 1 or 2, characterized in that at least one sensor electrode (8, 10) is assigned a shielding electrode (50, 52), which is held at the same electrical potential as the sensor electrode (8, 10).
4. The DNA chip as claimed in claim 3, characterized in that the electrical potential of the sensor electrode (8, 10) is held at the shielding electrode (50, 52) by a buffer amplifier (54) connected to the sensor electrode (8, 10) and having a gain of 1.
5. The DNA chip as claimed in claim 4, characterized in that the buffer amplifier (54) is integrated on the carrier (14).
6. The DNA chip as claimed in one of the preceding claims, characterized in that at least one sensor electrode (8, 10) and/or at least one shielding electrode (50, 52) are directly electrically isolated from the analyte (38).

7. The DNA chip as claimed in one of claims 1 to 6, characterized in that a sensor electrode (8, 10) contains pointlike individual electrodes (28) which are electrically connected to a buried electrode collective line (26) by means of plated-through holes (32).

8. The DNA chip as claimed in one of the preceding claims, characterized in that the thin-film microelectrode system is embedded in a reaction layer (44) containing catcher molecules.

9. The DNA chip as claimed in claim 8, characterized in that the thickness of the reaction layer (44) is less than 100 μm and is correlated with the width of the electrodes or the interspaces thereof.

10. The DNA chip as claimed in claim 9, the width of the electrodes being approximately 1 μm , characterized in that the thickness of the reaction layer (44) corresponds to approximately 5-10 times the value of the electrode width.

11. The DNA chip as claimed in claim 8 or 9, characterized in that the reaction layer (44) is a hydrogel.

12. The DNA chip as claimed in one of the preceding claims, characterized in that the thin-film four-pole system forms an interdigital current electrode arrangement with double meandering current taps.